

REMARKS/ARGUMENTS

Claims 1 – 9, 12 – 22, 24, 26 – 28, 31 – 33, 36 and 47 – 71 are currently pending and rejected.

The applicants amend claims 1, 3, 4, 5, 7, 8, 15, 16, 17, 24, 27, 48, 49 – 52 and 58. The applicants respectfully assert that claims 1 – 9, 12 – 22, 24, 26 – 28, 31 – 33, 36 and 47 – 71, as amended, are in condition for allowance for at least the reasons discussed below.

Rejection against Claims 1 – 9, 12 – 22, 24, 26 and 47 – 52 under 35 USC §112, first paragraph

The applicants have amended these claims to recite microprocessor instead of processor.

Rejection against Claims 1 – 7, 47 – 52 and 58 – 71 under 35 USC §112, second paragraph

The applicants respectfully disagree with the examiner's assertion that "voltage signal" and "modified voltage signal" are not consistent with the disclosure in the specification.

Paragraphs 18 through 22 of the specification discuss the signal generated by the signal generator 52 in FIG. 4 as being a voltage signal. Regarding the claims, "voltage signal" in claims 1 – 7, 47 – 52 and 58 – 71 is analogous to "divider signal" in the other claims.

Paragraphs 20 and 21 discuss, and FIG. 4 shows, the modification of the voltage signal by at least a patient's impedance. Regarding the claims, "modified voltage signal" in claims 1 – 7, 47 – 52 and 58 – 71 is analogous to "stimulation signal" in the other claims.

Rejection against Claims 1 – 7 and 47 – 52

The applicants respectfully assert that claim 1, as amended, is patentable over U.S. Patents 5,017,134 (Saito) and 5,759,159 (Masreliez) at least because Saito and Masreliez each fails to disclose an electrically conductive path that includes at least a portion of the mechanical coupling between a handpiece's dental instrument and the handpiece's driver that drives the dental instrument, and that across which a voltage signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined.

The applicant's claim 1, as amended, recites in part, a handpiece that includes a dental instrument, a handpiece driver mechanically coupled to the dental instrument, and an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver. Claim 1, as amended, also recites in part a voltage signal generated across the electrically conductive path when the proximity of the dental instrument to a tooth's apical foramen is to be determined.

For example, as shown in FIG. 4 and discussed in paragraphs 43 – 46 and 50 of the specification, the dental instrument may be a file 254 that a dentist uses to ream out or remove material located inside the tooth 216. In operation, a signal generator (52 in FIG. 2) disposed inside the apical foramen locator 240 (FIG. 4) generates a voltage signal. The voltage signal is applied across the series combination of a reference impedance (54 in FIG. 2) disposed inside the locator 240, the wire 257 coupling the locator 240 to the handpiece driver 258 that powers the rotation of the file 258, the electrically conductive path 256 that includes the mechanical coupling between the handpiece driver 258 and the file 254, the file 254, the body tissue 220, the lip clip 218, and the wire 211. By including the electrically conductive path in the series combination, one can avoid having to clip a lead from the locator 240 onto the file 254 and thus avoid clutter around the site of the dental procedure and problems associated with maintaining good electrical contact between the lead and the file 254 as the file rotates. The electrically conductive path, however, also allows electrical noise from the driver and other components of the handpiece to mix with the voltage signal. Because

of this the voltage signal must be isolated from the noise before it can be used to determine the proximity of the file to the tooth's apical foramen.

In contrast, Saito fails to disclose an electrically conductive path that includes at least a portion of the mechanical coupling between a dental instrument and its driver, and across which a voltage signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined. Saito appears to disclose a system for determining the proximity of a reamer 3 (FIG. 1) by monitoring the change in the difference between the impedance of two different voltage signals. As shown in FIG. 1, the circuitry for performing this function is coupled to the reamer 3 and electrode 5 placed on a patient's lip. The circuitry is not coupled to any portion of the mechanical coupling of the reamer 3 to a driver in the mechanical cutter 2. Therefore, unlike the applicant's claimed apparatus, Saito's system does not include an electrically conductive path that includes at least a portion of the mechanical coupling between a dental instrument and its driver, and across which a voltage signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined.

Also In contrast, Masreliez fails to disclose an electrically conductive path that includes at least a portion of the mechanical coupling between a dental instrument and its driver, and across which a voltage signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined. Masreliez appears to disclose an apical position detector 40 (FIG. 2) that includes a circuit 42 for determining the proximity of a probe 46 to a tooth's end region 64 (apical foramen). The circuit performs this function by monitoring several voltage signals each having different amplitudes and phases, and each applied across a patient's body tissue 66. As shown in FIG. 2, the circuit 42 is coupled to the probe 46 and to a lip electrode 48. Furthermore, the probe 46 is not mechanically coupled to a driver. Therefore, unlike the applicant's claimed apparatus, Masreliez's system does not include an electrically conductive path that includes at least a portion of a mechanical coupling between a dental instrument and its driver, and across which a voltage signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined.

Claims 2 – 7 and 47 – 52, as amended, are patentable at least by virtue of their dependencies on claim 1, as amended.

Rejection against Claims 8, 9, 12 – 22, 24 and 26

The applicants respectfully assert that claim 8, as amended, is patentable over Masreliez and U.S. Patent 6,425,875 (Reifman) at least because Masreliez and Reifman each fails to disclose an electrically conductive path that includes at least a portion of the mechanical coupling between a handpiece's dental instrument and the handpiece's driver that drives the dental instrument, and that across which a voltage signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined.

The applicant's claim 8, as amended, recites in part, a handpiece that includes a dental instrument, a handpiece driver mechanically coupled to the dental instrument, and an electrically conductive path that includes at least a portion of the mechanical coupling between the dental instrument and the handpiece driver. Claim 8, as amended, also recites in part a divider signal generated across the electrically conductive path when the proximity of the dental instrument to a tooth's apical foramen is to be determined.

In contrast and as discussed in the argument for allowing claim 1, as amended, Masreliez's system, unlike the applicant's claimed apparatus, does not include an electrically conductive path that includes at least a portion of a mechanical coupling between a dental instrument and its driver, and across which a signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined.

Also in contrast, Reifman fails to disclose an electrically conductive path that includes at least a portion of the mechanical coupling between a dental instrument and its driver, and across which a voltage signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined. Reifman discloses an apex detector 1 (FIG. 1) that includes a circuit for determining the proximity of a probe 5

to a tooth's apex 27. The circuit performs this function by monitoring one or more voltage signals applied across a patient's jaw tissue 28. As shown in FIG. 1, the circuit is coupled to the probe 5 and to a lip electrode 6. Furthermore, the probe 5 is not mechanically coupled to a driver. Therefore, unlike the applicant's claimed apparatus, Reifman's system does not include an electrically conductive path that includes at least a portion of a mechanical coupling between a dental instrument and its driver, and across which a voltage signal is generated when the proximity of the dental instrument to a tooth's apical foramen is to be determined.

Claims 9, 12 – 22, 24 and 26, as amended, are patentable at least by virtue of their dependencies on claim 8, as amended.

Rejection against Claims 27, 28, 31 – 33, 36 and 53 – 57

Claim 27 is patentable over Reifman and Masreliez for reasons similar to those recited above in support of claim 8 over Reifman and Masreliez.

Claims 28, 31 – 33, 36 and 53 – 57, as amended, are patentable at least by virtue of their dependencies on claim 27.

Rejection against Claims 58 – 71

Claim 58 is patentable over Saito and Masreliez for reasons similar to those recited above in support of claim 1 over Saito and Masreliez.

Claims 59 – 71 are patentable at least by virtue of their dependencies on claim 58.

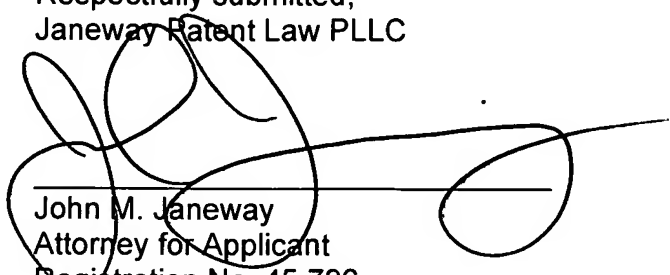
Conclusion

The applicants respectfully request that the examiner withdraw the rejection against claims 1 – 9, 12 – 22, 24, 26 – 28, 31 – 33, 36 and 47 – 71, and issue an allowance for these claims as amended.

If, after considering this response, the examiner believes the claims should not be allowed, the applicants respectfully request that before issuing an Office Action, the examiner call the applicants' attorney, Mr. Janeway (206-708- 7705), to schedule a telephone conference to further the prosecution of the claims.

Dated this 26th day of January 2009.

Respectfully submitted,
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